REMARKS

I. Amendments

(I-1) Claim 1 has instantly been amended as follows:

The limitation of claim 6 (use of a hard coat layer) has instantly been introduced into claim 1.

Further, the porous silica layer has instantly been limited to one which contains an alkaline earth metal salt. Support for this amendment is found at page 46, line 15-18 of the specification of the present application.

Claim 6 has been cancelled accordingly.

(I-2) Claims 14 and 15 have instantly been amended so as to introduce thereinto the same limitations as those mentioned in item (I-1) above.

Thus, no new matter has been introduced by the instant amendments.

II. Rejection of the claims

In the outstanding Office Action, the Examiner has rejected claims 1, 3, 5, 14 and 15 under U.S.C. 103(a) as being obvious over Lange et al. (US 4816333)(hereinafter "Lange") in view of Takahashi et al. (US 6251523)(hereinafter "Takahashi"). Specifically, the Examiner states:

> that "Lange teaches the laminated structure of the present invention except that Lange is silent about the use of a "colloidal solution comprising chain silica fine particles (moniliform silica strings)"; and
>
> that, 'however, Takahashi discloses the use of a "colloidal silica solution comprising chain silica fine particles and silica (colloidal forming hydrolysable silica) for forming a coating on glass windows having a small reflectivity (antireflection at high incident angle for an improved visibility)".

Applicants respectfully traverse.

As mentioned in item **I.** above, claim 1 of the present application has instantly been amended.

As can be seen from instantly amended claim 1 of the present application, the silica-containing laminated structure of the present invention has the following characteristic features:

(1) At least one porous silica layer is limited on a transparent thermoplastic resin substrate through a hard coat layer having a water contact angle of 85° or less.

(2) The porous silica layer contains an alkaline earth metal salt.

(3) The porous silica layer has a refractive index of 1.22 or more and less than 1.30.

(4) The porous silica layer has a pencil hardness of H or higher.

(5) The porous silica layer has a specific pore size distribution.

(6) The laminated structure has a minimum reflectance of from 0.1 to 0.45 %.

The porous silica layer is formed from a coating composition containing an alkaline earth metal salt and specific moniliform silica strings.

The laminated structure having the above-mentioned characteristic features (1) to (6) is not obvious over Lange even in view of Takahashi. More specific explanations are made below.

Firstly, it should be noted that the technique of Takahashi is too remote from the technique of Lange so that those skilled in the art would not combine Takahashi with Lange.

Takahashi discloses a "visible light reflection preventing glass plate, said glass plate comprising a glass substrate and a film having an outer surface" (see, for example, claim 1 of Takahashi). On the other hand, Lange uses polymeric substrates as explained later in more

detail. Due to the difference in the substrate, Takahashi forms a silica coating under very high temperature conditions which are inapplicable to Lange.

Specifically, in the Examples of Takahashi, the silica coatings are formed by sintering the silica particles at very high temperatures (e.g., 500 °C) for a long time (e.g., 1 hour), as apparent from the following descriptions of Takahashi:

> "[First Embodiment]
>
> There is provided a mixture of 3.0 parts by weight of hydrolytic condensation polymerization liquid of ethyl silicate (trade name: HAS-10 made by Colcoat Co., SiO_2 content: 10% by weight), 13.3 parts by weight of chain silica colloid (trade name: Snowtex OUP made by Nissan Chemical Industry Co., Ltd. solid content 15% by weight, containing dispersion auxiliary) having an average diameter of about 15 nm and average length of about 170 nm, and 74.9 parts by weight of 2-propanol at room temperature, which is diluted with threefold parts by weight of 2-propanol and stirred at room temperature for 2 hours to obtain a coating solution for forming low refractive index dents and projections layer. The coating solution contains the chain silica fine particles and ethyl silicate in a ratio by weight of 100:15 by conversion into silica, respectively. This coating solution also contains 670 parts by weight of the chain silica fine particles, 45 parts by weight of the water, 4.5 parts by weight of acid catalyst and solvent against 100 parts by weight of silicon compound.
>
> A soda lime silicate glass plate (65 mm × 150 mm × 3 mm) which is surface polished with a cerium oxide type abrasive and washed, and further subjected to supersonic washing in pure water and dried, is immersed in a coating solution for forming the above low refractive index dents and projections layer, and pulling up at a velocity of 20 cm/min. to coat the coating solution on both surfaces of the glass plate. The resulting glass plate is dried at 100 °C. for 30 minutes, and further subjected to heat treatment in an oven at 500 °C. for 1 hour after drying at 250 °C. for 30 minutes to obtain a glass plate having the silica dent and projection film of 140 nm in thickness formed on each surface." (emphasis added) (col.8, lines 21 to 52); and
>
> "[Second Embodiment]
>
> In place of the soda lime silicate glass plate (65 mm × 150 mm × 3 mm) used in First Embodiment, a glass plate for an automobile wind shield having the same

> soda lime silicate glass composition (about 150 cm × about 60 cm × 3 mm) is used, which is subjected to dip coating, drying, and heat treatment by known step for bending (heat for 15 minutes at 570 °C.) in the same manner as in First Embodiment to produce a glass plate for an automobile wind shield having a silica dent and projection film of thickness 120 nm formed on each surface." (emphasis added) (col. 11, lines 15 to 24)
>
> (In the rest of the Embodiments of Takahashi, the glass plate/silica film laminates obtained in the First and Second Embodiments are used.)

On the other hand, Lange uses a polymeric substrate (see, for example, col.2, line 36 to 37 of Lange). Needless to say, if the silica particles in a coating formed on a polymeric substrate are sintered at a temperature as high as 500 °C for as long as 1 hour, the polymeric substrate is markedly deteriorated. In fact, in the Examples of Lange, the coatings formed on polymeric substrates are dried at relatively low temperatures for a short time, e.g., 100 ° for 2 minutes or 93 °C for three minutes (col. 6, line 24 to 27, and lines 65 to 68 of Lange).

Therefore, those skilled in the art would not think that the technique of Takahashi can be directly applied to Lange.

In addition, with respect to the purpose of the high temperature sintering in Takahashi, Takahashi describes that the high temperature sintering improves the strength of the laminated structure. Specifically, Takahashi has the following description:

> "According to necessity, heat treatment may be given at a temperature between 400 °C. and 750 °C. for 5 seconds to 5 hours, by which the silica dent and projection film on the surface of the glass substrate becomes strong. This dent and projection film comprises a matrix of silica fine particles and silica (derived from organic metal compound), wherein the chain silica fine particles are fixed to the glass substrate by the silica matrix, and the surface configuration of the chain silica fine particles forms the dents and projections of the film." (emphasis added) (col.7, lines 31 to 40)

Thus, Takahashi suggests that the sintering at high temperatures is necessary for satisfactory strength of the glass plate/silica film laminate.

Therefore, those skilled in the art who intend to improve the antireflection properties and strength of the laminated structure of Lange would not be motivated to apply the technique of Takahashi to Lange in disregard of:

the fact that, for improving the strength, Takahashi performs the sintering of silica particles at very high temperatures which are inapplicable to Lange, and

the teaching of Lange that "particle agglomeration prior to preparation of the coating composition" should be prevented (at col. 5, lines 28 to 36 of Lange).

From the above, it is apparent that those skilled in the art would not combine Lange with Takahashi to make the laminated structure of the present invention which has excellent antireflection properties as well as excellent strength.

Furthermore, neither Lange nor Takahashi has any teaching or suggestion about the use of the hard coat layer and the use of the alkaline earth metal salts, which are features instantly incorporated into claim 1 of the present application.

More specifically, the laminated structure as recited in amended claim 1 has a hard coat layer having a water contact angle of 85° or more. By the use of the hard coat layer having a water contact angle of 85° or more, the strength of the surface of the transparent thermoplastic resin substrate can be improved (see page 23, lines 9 to 13 and page 31, line 18 to page 32, line 16 of the present specification).

Further, the porous silica layer of the laminated structure as recited in amended claim 1 contains an alkaline earth metal salt. By the use of the alkaline earth metal salt, the strength of

the laminated structure of the present invention can be further improved (page 46, lines 15 to 18 of the present specification). In this connection, attention is drawn to Comparative Examples 4 and 5 of the present application, the results of which are shown in Table 4 on page 111 of the present specification. As can be seen from Table 4, in Comparative Examples 4 and 5, the laminated structures are produced in the same manner except that an alkaline earth metal salt (10 % $CaCl{\cdot}2H_2O$ 0.092 g) was not used in Comparative Example 4. As a result, the laminated structure of Comparative Example 4 suffered cissings and the strength thereof was very poor (pencil hardness in Comparative Example 4 was lower than HB, whereas the pencil hardness in Comparative Example 5 was 2H).

With respect to the use of the above-mentioned hard coat layer and alkaline earth metal salt, neither of Lange nor Takahashi has any teaching or suggestion.

From the above, it is apparent that the laminated structure (claim 1) and antireflection films (claims 14 and 15) of the present invention are not obvious over Lange, even in view of Takahashi. Reconsideration and withdrawal of the outstanding rejection are respectfully requested. Moreover, in view of the foregoing, Applicant believes the pending application is in condition for allowance. A Notice of Allowance is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Monique T. Cole, Reg. No. 60,154 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

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